

## CARCINOMA AND THE CERVICAL LYMPHATIC SYSTEM.\*

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While the surgical treatment of malignant growths cannot be said to be ideal, it is at present the rational method of dealing with such neoplasms and will remain so until laboratory research has given us definite information as to their etiology and possibly their treatment by other means. Years of careful clinical work have thoroughly established two important principles in the handling of these conditions: First, the thorough removal with a good margin of sound tissue of the primary growth and, secondly, the extirpation of the whole lymph bearing area.

It is singular that the importance of this second principle has not been as generally realized in handling the lymphatic channels of the neck, secondary to carcinomatous conditions about the face and mouth, as in treating the corresponding area of drainage in cancer of the breast, for the chances of affecting a permanent cure are in the first instance much greater. Cancers about the face and mouth are of the squamous cell type and they form internal metastases very rarely, the cervical lymph glands serving as an effectual barrier against the further progress of the disease. This fact is particularly fortunate. Kuttner found in cancer of the tongue but four cases of distant metastases out of a large number examined from different clinics in Germany, and it is in this form that infection spreads most rapidly.

Nevertheless there seems to be an apathy on the part of many operators and the neck is not treated with that thoroughness which characterizes operations on the axilla. The true reasons are to be found in the mechanical difficulties which have deterred many and the fact that a small percentage of carcinoma of the head remain well without the extirpation of the cervical lymphatics. Not a few surgeons open the neck only when the glands are perceptibly enlarged and then remove those that can be easily palpated.

Glandular metastases are more to be feared in certain regions of primary growth than in others. Anton Meller, in a careful review of 327 cases of epithelial carcinoma of the head and neck, reports that the glands of the neck were involved in 90 per cent of all cancers of the lower lip, but that in cancer of other portions of the face the involvement was from 18 to 43 per cent. It may be added that glandular metastases are more to be feared in cancer of the tongue than in lip cancer. The tongue and lower lip are far richer in lymphatic drainage than other portions of the head. That the lymphatics may be removed thoroughly and systematically it will be necessary to know not only the positions of the gland groups but the areas which they drain. For the sake of simplicity the discussion will be limited to the lower lip, the tongue and the alae of the nose. The nodes which here concern us are the parotid, the submaxillary, the submental and the deep cervical groups and their relative positions are shown in the diagram (Fig. 1).

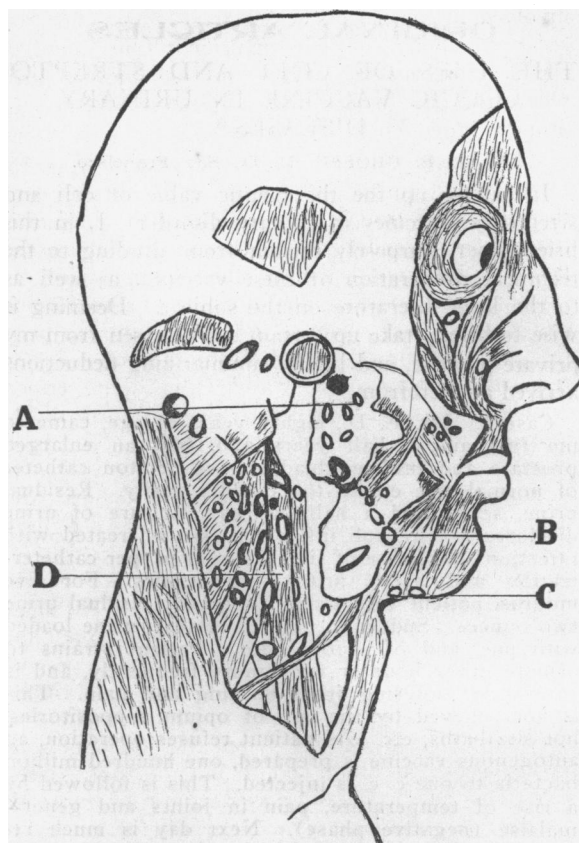


Fig. 1—Lymphatics of the Neck (adapted from Delamere, Poirier and Cuneo). A—Parotid Group. B—Submaxillary Group. C—Submental Group. D—Deep Cervical Chain.

In the parotid region there are one or two subcutaneous nodes between the parotid fascia and the salivary gland. The deep nodes are within the parotid salivary gland but fortunately they drain the region of the eye, the scalp, the root of the nose and the upper portion of the cheek. In carcinoma of the posterior portion of the tongue the removal of the lower zone of the parotid gland is essential.

The submaxillary group is made up of three to six nodes superficially embedded in the sheath of the submaxillary salivary gland. Sometimes they are even found in the gland substance. It is practically impossible to remove these nodes without extirpating the salivary gland itself and this should always be done when the group is attacked for malignancy. The submaxillary glands drain in turn into the deep cervical glands.

The submental group consists generally of two glands which lie upon the mylo-hyoid muscle between the anterior bellies of the two digastric muscles.

The deep cervical are numerous nodes which extend from the mastoid process to the root of the neck. They lie under and posterior to the sternocleido-mastoid muscle and are in intimate relationship with the internal jugular vein.

*The Lower Lip.* The lymphatic channels from the lower lip empty into the submental and submaxillary nodes and these will generally block infection for quite a period. Infection of a deep cervical gland sometimes takes place early but not frequently. The deep cervical chain is, however, often

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involved in lip cancers which have gone some time before receiving surgical attention. One gland on the anterior surface of the internal jugular vein, where the omo-hyoid muscle crosses it, is especially prone to infection in these cases.

**The Tongue.** The lymphatic vessels from the forepart and tip of the tongue drain directly into the submental group. The middle of the dorsum of the tongue, its edge, lower surface and the entire floor of the mouth empty their lymph into the submaxillary nodes. The dorsum of the tongue, still further back, empties its lymph into the parotid group, while the lymph from the anterior portion rarely passes this way. The deep cervical glands are involved very early in this form of the disease and should always be removed. A cancer of the tongue, however small, may involve all groups so that the total extirpation of the lymphatic area upon the affected side is necessary. The tongue is made up of two halves which must be considered as anatomical entities, for each has its own nerves, its own blood vessels and lymphatics. Although these systems anastomose across the raphe, the clinical fact remains that cancer on one side does not readily cross the median line. Where the primary growth is situated on or very near the raphe it is essential to clean out the lymphatics on both sides of the neck; in other conditions it is only necessary to operate on one side, as Butlin in his large experience has shown. The tendency for cancer to spread toward the base of the tongue and not in the direction of its tip makes the removal of the lower zone of the parotid gland necessary in all cases, and when this is perceptibly involved, it is imperative also to carry the dissection into the posterior triangle of the neck.

**The Nose.** From the alae of the nose the lymphatics drain directly into the submaxillary and submental nodes. While there is little danger of metastases in superficial epitheliomata, especially in the aged, this danger becomes materially augmented when the malignant process reaches a deeper level. In this group of cases there seems to be a strong tendency to neglect operation upon the neck. Although the immediate danger is not as great as in carcinoma in other locations, it is sufficient to demand thorough removal of the submental and submaxillary nodes in each instance.

In the extirpation of lymphatics I prefer the transverse or collar incision, because it not only gives a large and free exposure of the node groups but allows also a careful inspection of both sides of the neck. This incision should parallel a neck fold and should extend from the posterior border of the sterno-cleido-mastoid transversely across the neck, just above the thyroid cartilage, to a corresponding point upon the opposite side. The external jugular veins are caught and tied securely above and below. The skin is rapidly dissected up until the flap can be easily raised over the symphysis of the jaw (where it is held by a strong traction suture in the hand of an assistant), thus freely exposing the submaxillary and submental areas. The incision can be carried further back if desired. This flap should be made

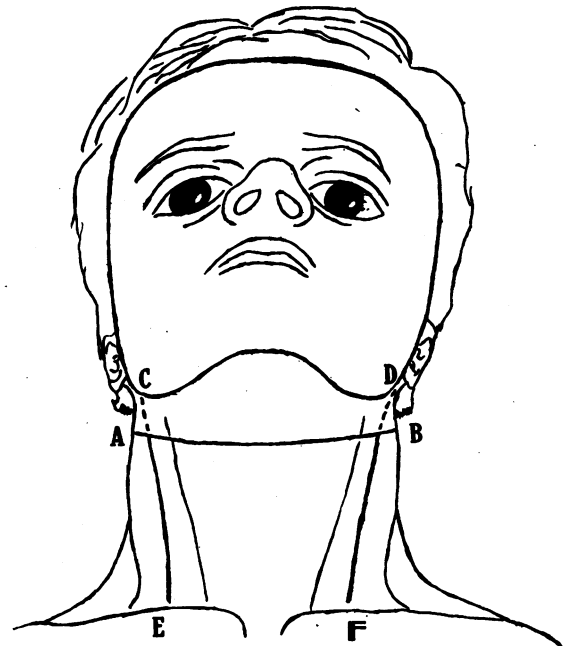


Fig. 2—Shows lines of incision employed in extirpation of the Lymphatics of the Neck. The transverse incision AB extends from the posterior border of the sterno-cleido-mastoid muscle transversely across the neck, just above the thyroid cartilage, to a corresponding point upon the opposite side. This incision may be carried further back if desired. In the removal of the deep cervical chain a longitudinal incision along the sterno-cleido-mastoid will be necessary, CE, DF. The dotted portion of the line of incision is made only when removal of the lower zone of the parotid gland is desired.

of skin alone as there is a superficial node lying in the subcutaneous fat over the submental region and another over the submaxillary gland. The submaxillary and submental nodes and their lymph channels should be removed *en bloc* together with the submaxillary gland. This gland is shelled out until the duct is reached; if this be tightly tied with silk the operator need have no fear of the formation of a salivary fistula. If one is dealing with a carcinoma of the lower lip the nodes and their channels, together with the submaxillary glands, should be thoroughly removed on both sides of the neck. Quite an area can be uncovered by dissecting down the skin to form a lower flap, stab drains of silkworm gut being placed at the lowest level. The incision is sutured by a subcuticular stitch of catgut or a through and through stitch of horse hair. The line of suture is protected with silver foil and a layer of fluffed gauze; a piece of gutta-percha tissue is next bound tightly over these by adhesive plaster to protect the wound surface from the dribbling of saliva which is so often an accompaniment of operations upon the lip and tongue. The skin of the neck, following the removal of the lymphatics, is frequently the seat of a hard lymph oedema which may persist for several weeks.

The transverse neck incision, if good coaptation be obtained in suturing, leaves a scar which after a short time is hardly perceptible, a fact to which Kocher early drew attention. This is no small gratification to the patient and, as the area exposed by the upper flap is satisfactory, there is no reason why it should not be more generally employed. The

longitudinal incision stretches and thickens but it will be necessary to use it also in those cases in which a block dissection of the deep cervical glands is performed. This should be done on one or both sides in every case in which the transverse incision has shown that the superficial glands are infected, and in all cases of cancer of the tongue. The incision runs along the middle portion of the sterno-cleido-mastoid and should extend from the transverse incision above to the clavicle below. In cancer of the tongue, in which it is necessary to remove the lower portion of the parotid gland, the longitudinal incision should be carried to a point a little below the mastoid process.

The skin flaps are rapidly dissected up and the sterno-cleido-mastoid muscle exposed freely. By liberating the posterior border of this muscle and then pulling it well forward, the deep cervical glands can be easily reached. These glands and lymphatic vessels should be thoroughly removed *en bloc* together with fat, connective tissue, portions of muscle if necessary and the internal jugular vein, if the glands are so adherent to it that they cannot be easily separated. Butlin, who first proposed and practiced this extensive operation, has even gone so far as to remove a portion of the external carotid artery. Blunt dissection should be avoided and great care should be taken to handle the lymphatic tissue as little as possible, thus avoiding the dissemination of cancer cells. It is surprising how much tissue can be sacrificed. All of the structures on one side of the neck, with the exception of the internal carotid artery, may be removed. Extirpation of one sterno-cleido-mastoid muscle causes little inconvenience and Crile has several times removed both. The sterno-hyoid, sterno-thyroid, digastric, omo-hyoid and platysma are of comparatively small importance. Bilateral excision of the vagi is fatal, but unilateral excision is attended by hoarseness and an irregularity of the pulse which persists for several days only. Excision of one phrenic is followed by paralysis of less than half the diaphragm. Excision of one hypoglossal affects the tongue considerably in speech, especially at first; in bilateral excision a fatal pneumonia usually ensues. While the internal jugular can be removed on one side without risk, as advocated by Cheyne, the operator must be assured of a collateral circulation before removing the second. It is true that in the neck many glands may be enlarged without showing cancerous involvement under the microscope. It is unwise, however, to assume that these inflammatory changes are innocent and that the glands would do no harm if allowed to remain *in situ*.

The greatest difficulty in these operations is the control of hemorrhage, which is oftentimes stubborn and persistent. If the table is on a sharp incline, the head well elevated, much has already been accomplished in eliminating the troublesome venous oozing. A table that is easily adjustable is desirable, for it may be necessary for the anaesthetist to change the patient's position to the horizontal at any time. Whitehead often prefers that the patient should be in a sitting posture in operating on the tongue. A large number of mosquito haemostats will gen-

erally suffice for the arterial hemorrhage. Crile has practiced, in a large number of cases, temporary closure of the common carotid by means of a special clamp prior to the block dissection. He now closes the common carotid until the dissection has been carried up to its bifurcation, when the clamp is transferred to the external carotid artery. Fortunately the sheath of the artery is very seldom involved in the cancerous process, as its ligation carries with it great danger of embolism. It is most important that the patient lose just as little blood as possible. Gaylord, Ehrlich, Bashford, Beebe and Ewing have all shown that animals who are bled have their resistance to the disease decreased. It would seem that the patient who loses the most blood has the least chance of making a permanent recovery.

I have considered it outside the confines of this paper to take up the discussion of the initial lesion and its treatment, but it may be said that operative removal of the glands and lymphatic channels of the neck should precede that of the primary growth. Boyd and Unwin have emphasized the fact that if the tongue be extirpated at one sitting and the lymphatics removed one or two weeks later, an increased flow of lymph will result and the disease be more widely disseminated. Whether both operations are performed at the same time will depend largely upon the extent of the involvement and the physical condition of the patient. In cancer of the lower lip the tumor can be generally removed by a broad V-shaped incision at the same sitting. It is probably wiser to extirpate a cancer of the tongue nine or ten days after the neck operation or even at a later time.

It is not uncommon to find lymphatic involvement at a very late date after operations which remove the primary growth alone, and the three-year period, which has figured in statistics of the very small number of recoveries from this method of treatment, is not to be depended on. The following instance is given in illustration: In April of this year I saw a man of fifty-five years of age with a tumor the size of a walnut in the median line of the neck just below the symphysis. His general health had been good but he had been a constant smoker for forty years. The mouth was entirely negative, but on the lower lip, very near the left angle, was a small scar. The patient stated that seven years before an ulcer had appeared on this site which had been pronounced a cancer and had been treated by the application of caustic pastes. It had given him no further trouble. He had always held his pipe on this side of his mouth, but the ulcer had forced him to shift its position to the opposite side which had since been his habit. He had noticed the tumor in the neck but three weeks and it was freely movable. I advised immediate operation but the patient did not consent until one month later. The tumor was then the size of a small egg, firmly adherent to the underlying muscle and directly in continuation with the symphysis of the jaw. The left submaxillary gland was enlarged but there was no general glandular enlargement. The tumor was found to be a metastatic carcinoma involving the submental nodes. The pathologist reported that

all the other nodes removed which he had examined, including both submaxillary salivary glands, were negative.

#### Summary.

It is often difficult to decide just how extensive operations should be. From the published statistics I have deduced the following rules for my own guidance and they may be of assistance to others; many of the principles have already been mentioned in the body of this article.

In cancer of the lower lip the lymphatic channels with the submental and submaxillary nodes on both sides, including the submaxillary salivary glands, should be removed by a block dissection; if any of these nodes are thought to be cancerous a block dissection of the deep cervical glands should be done as well on the corresponding side. If the infected glands are in the median line, the deep cervical chains on both sides should be removed.

In cancer of the tongue the deep cervical nodes so quickly become infected that their extirpation, together with the submental and submaxillary nodes and the submaxillary salivary gland upon the affected side, is imperative. When the growth is on the posterior portion, the lower zone of the parotid gland should also be removed and, if this is involved, a dissection of the posterior triangle of the neck will also be necessary. Only in those cases in which the primary tumor is on or very near the raphe will it be necessary to operate on both sides of the neck. DaCosta cites an instance in which the disease affected both sides of the neck, the primary tumor being strictly unilateral. Fortunately such instances are rare. The transverse skin incision gives abundant opportunity for the examination of the glands on both sides.

In cancer at or near the alae of the nose the submaxillary and submental nodes, together with the submaxillary salivary gland upon the corresponding side, should be removed *en bloc*. The deep cervical chain is dissected out when the other nodes are involved.

An enlarged gland should be considered as cancerous. Removal of the tissues between the primary disease and the glands adds so much to the risk of the operation that it is not to be performed unless the primary growth is very extensive.

It is safe to prophesy that the time is not far off when all operators will treat the lymphatic area of the neck with the same degree of thoroughness as is now given to the eradication of lymphatic channels in the axilla. We can believe that when this time comes, statistics of cures for cancer of the face and mouth will exceed those of cancer of the breast.

### IMPORTANCE OF THE EYE, EAR, NOSE AND THROAT EXAMINATIONS IN THE RAILWAY SERVICE.\*

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This is rather a long title, but I promise you a very short paper. This subject was selected because I feel convinced that the examination of the eye

and ear beyond vision and audition receives too little attention, and the nose and throat none at all.

This conviction is based upon the greater percentage of pathologic conditions encountered in this field among railway employees than in like classes of similar service where a closer scrutiny of these organs is demanded, and further, if the applicant had been properly inspected before entering the service, there certainly would not be such a great number of defective men, since the conditions alone are not sufficient to account for the excessive percentage above noted.

The importance of a thorough investigation of the eye, ear, nose and throat is recognized by the civil service, army and navy examinations; and is, so far as my experience goes, rigidly observed. The American Railway Association have but one provision for these examinations. "Rule 1—Applicants with trachoma or other inflammatory conditions of the eyes, or with chronic discharges from the ear are disqualified."

That is rather too general in its application to the eyes, and ears, and does not take up the nose and throat at all.

The Southern Pacific Company have endeavored to cover the ground by having the following questions put to the applicant:

1. Have you ever had any disturbance of sight such as blurring, pain in the eyes or over the eyes after reading or dizziness?
2. Have you ever had any acute or chronic inflammation of the eyes?
3. Have you ever had ear-ache or discharge from the ears?
4. When did the ear discharge last?
5. Have you any obstruction to breathing through either nostril?
6. Do you take cold in the head easily or have you chronic catarrh of the nose or throat?
7. Have you ever consulted a physician for any trouble with your eyes, ears, nose, or throat?
8. Who was the physician, for what trouble did he attend you, when and how long?

It is our experience that these questions are barren of results. The applicant's answers cannot be depended upon. He is before you to show that he is without fault; obviously he will not confess them if he has any. If his application was for benefits, rather than employment, he could immediately flood you with symptoms. I may admit that I am suspicious of most applicants for whatever form of employment or insurance. In answer to questions they often say, "That is up to you to discover." And assuredly, they do not lend their aid in the investigation. Not infrequently, while examining the applicant's nares, where the diagnosis was pushed in box car letters like the handwriting on the wall, I have asked him if he had ever had nasal catarrh, and he would cheerfully answer, "No." And when you exhibit the evidence of such chronicity they account for it by saying, "They caught a little cold last night."

Again the evidence of the importance in the examination of these special organs lies in the entailing of grave diseases from the slighter ones. These lesions, simple in the initiative, may not only disable the individual, but in time may be the causation

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